

1.7 INNOVATION LED SUSTAINABLE GROWTH FOR ETHNOVETERINARY MEDICINE

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Every country has the responsibility for sustaining development in all walks of life by promoting ideas in strategic lines. A development strategy that focuses only on production capital and intellectual capital is not sustainable. This is equally true for developed as for developing economies. Traditional knowledge is suitable for masses living under poverty. Ethnic plants and their role in veterinary medicine is an important area which could sustain the life of rural masses in India. Ethnic medicine treats more than 70 per cent of population and their role is well recognized in underdeveloped nations and strategies are made to develop this field. For example, South Africa, Brazil, Kenya have ambitious plans to develop a life-science hub with biotechnology at the core. Ethnic plants and knowledge will be the strategy to provide medication to billions of Africans. In our country, this has been in existence for thousands of years. However, practicing it in animal population is a new idea. Ethno veterinary medicine is the theme that also can be developed in a major way by adopting innovation system and research.

The innovation in ethnoveterinary medicine

Ethnoveterinary medicine (EVM) considers that traditional practices of veterinary medicine are legitimate and seeks to validate them. In the 1980s the term "Veterinary Anthropology" was coined for a particular approach to animal health care, which was researched through "using the basic repertoire of anthropology's research skills and techniques, including observation, interview and participation" (Köhler-Rollefson and Bräunig, 1998). The holistic, interdisciplinary study of local knowledge and its associated skills, practices, beliefs, practitioners, and social structures pertaining to the healthcare and healthful husbandry of food, work, and other income-producing animals, always with an eye to practical development applications within livestock production and livelihood systems, and with the ultimate goal of increasing human well-being via increased benefits from stock raising. This knowledge on EVM is a valuable resource for sustainable development in the context of providing medical care to our cattle which is the largest in the world.

- Stock owners continue to utilize EVM until better alternatives in terms of efficacy, low cost, availability and ease of administration, are found. By far the most-studied element of EVM is veterinary ethno-pharmacopoeia, especially botanicals. they can generate useful information needed to develop livestock healing practices and methods that are suited to the local environment,
- EVM could be a key veterinary resource and could add useful new drugs to the pharmacopoeia, and
- EVM can contribute to biodiversity conservation.

The innovation system concept may be regarded as a practical tool for designing innovation policy. But it might also be seen as a synthesis of analytical results produced by scholars working on innovation. Often scholars have applied a narrow understanding of the innovation concept and this has gives rise to so-called 'innovation paradoxes' which leave significant elements of innovation-based economic performance unexplained.

In economic geography the diffusion of the innovation system perspective has, together with the industrial district and industrial clusters approaches, contributed to the construction of a 'new economic geography' that has changed the way geographical location and agglomeration is explained (Cooke 2001; Clark, Feldman and

Gertler 2000; Martin, R. Sunley, P. (2003). Without a broad definition of the national innovation system encompassing individual, organizational and inter-organizational learning, it is impossible to establish the link from innovation to economic growth. A double focus is needed where attention is given not only to the science infrastructure, but also to institutions/organisations that support competence building in new knowledge like ethnic plants, education and working life. This is especially important in the current era of the globalizing learning economy (Lundvall and Johnson 1994; Lundvall and Borrás 1998; Archibugi and Lundvall 2001). Actually, innovators regard the neglect of 'learning as competence-building' as the principal weakness of standard economics and the narrow definitions of innovation systems as reflecting a negative spill-over from this misdirected abstraction. The Triple Helix approach focusses on science and the role of universities in innovation (Asheim, B. and M. Gertler, 2004).

Regional, sectoral, technological and corporate systems

Over the last decade several new concepts representing the systemic perspective on innovation have been developed. The literature on 'regional systems of innovation' has grown rapidly since the middle of the 1990s (Cooke 1996). Franco Malerba with colleagues from Italy developed the concept of 'sectoral systems of innovation' (Breschi and Malerba 1997). The corporate system perspective may also have economic performance at focus at the level of the single enterprise. The other perspectives aim at explaining the innovation process in relation to specific technologies and sectors. The sectoral system approach is unique among the different approaches in not defining as analytical object a vertically integrated system. The approach may be seen as the outcome of innovation economics. Radically new technologies or ideas cannot flourish in firms 'locked in' into old organisational forms and competence sets. At the aggregate level it corresponds to the need to transform societal institutions, competences and organizations in order to reap the benefits of technological revolutions.

Different perspectives on national systems

Scholars, comparing national systems in terms of how they differ in qualitative terms and in terms of how they perform, have developed and made use of different perspectives. The analysis of the national competitive advantage by Michael Porter borrowed some ideas from the innovation system tradition – especially the importance of domestic demand and domestic user for product innovation. But he also added unique ideas about the positive impact of domestic competition on innovation in specific sectors of clusters.

Whitley's analysis of national business systems offers important inspiration for the analysis of innovation systems. The analysis is broader and it introduces cultural and social dimensions in the analysis. A strategy like ethnic plants and medicine has social dimensions also. Similar intentions lie behind the concept Social Systems of innovation (Amable, Barré and Boyer 1997).

Does the innovation system have a function?

The innovation system has 'as general function' to pursue innovation processes. His functionalist approach seems to emanate from a version of system theory as is practiced among engineers. If I were to assign a function to the national system of innovation I would be more specific than defining it as just 'pursuing innovation' and propose that the function is to contribute to economic performance on the basis of processes of creation and diffusion of knowledge on EVM. We can see the listing of a number of 'activities' as being potentially useful as establishing a checklist for managers and policy makers (Rickne 2000). It might also be helpful when comparing market with non-market economies. But in terms of theoretical understanding, it represents a step backwards since much of what we already know about the innovation process is neglected. For instance the

distinction made between the three kinds of learning neglects that one of them (innovation) comes out of practising the other two (R&D and competence building). Many recent contributions to innovation systems have different and in a sense more modest ambitions 'to explain innovation' by linking inputs in terms of investment in R&D to outputs in terms of patents or new products. They may emanate from scholars connected to technical universities and business schools and have as principal aim to give good advice to business managers or specialised government agencies. The neglect in standard economics of 'learning new EVM knowledge as competence building' is a major weakness that makes it less relevant for understanding innovation and dynamic economic performance, especially in the current era of the learning economy.

Knowledge and learning

It is stated that 'the most fundamental resource in the modern economy is knowledge and, accordingly, the most important process is learning. The understanding has been developed using the basic distinctions between information and knowledge, between 'knowing about the world' and 'knowing how to change the world' and between knowledge that is explicit and codified versus knowledge that remains implicit and tacit. Lundvall and Johnson (1994) introduced a distinction between Know What, Know Why, Know How and Know Who that has proved to be useful in understanding knowledge creation and learning in innovation systems. These distinctions are especially helpful when it comes to contrast the theoretical micro foundations of innovation systems with those of standard economics.

Different meanings of learning

As any everyday concept learning has several different connotations. In the literature on learning organizations it is often referred to as adaptation: as a process where agents when confronted with new circumstances register and internalize the change and adapt their behaviour accordingly. In education we see learning also as a process of competence-building. We assume that new competences can be established through education and training and thereafter mobilized when coping with and mastering theoretical and practical problems.

In our analysis of innovation systems we see learning as referring both to adaptation and competence building. And we emphasize that competence building takes place on-the-job through learning by doing, learning by using and learning by interacting.

Welfare and inequality in the context of innovation systems

A promising line of research is to link the perspective of Amartya Sen (1999) on welfare and inequality to the national system perspective. Sen presents a capability-based approach where development is seen as an expansion of the substantive freedoms that people enjoy. Substantive freedoms are defined as the capabilities people have to live the kind of lives they have reason to value. They include things like being able to avoid starvation, diseases and premature mortality of the people and their household animals. This way of looking at development refers to the capabilities people have to act and to choose a life they value. Poverty, for example, is in this perspective more a deprivation of basic capabilities than just low income. Human capabilities rather than resource endowments are the fundamental factors of development. The learning capability is thus one of the most important of the human capabilities and it is conditioned by national institutions and forms of work organisation. It does not only have an instrumental role in development but also, under certain conditions, substantive value. When learning takes place in such a way that it enhances the capability of individuals and collectives to utilize and co-exist with their environment, it contributes directly to human well-being.

But in most developed economies there has been a long history of institution building that helps to cope with sustainability. A success in terms of economic growth in a less developed economy may therefore create extreme tension between growth and sustainability. Directing the efforts of the innovation system toward solving crises in ecological and social terms may be necessary in order to avoid real 'limits to growth'.

Innovation may have a positive role in bolstering sustainability. Technical innovation, for instance in terms of developing substitutes to naturally scarce raw products, may help to overcome the fact that natural capital cannot always be reproduced. In a similar vein new social institutions may help to overcome a crisis where social capital gets fragmented. In both cases it is important to note that the workings of unhampered market forces may in the longer term erode the basis of economic growth. This perspective indicates a broader and more interdisciplinary approach to national innovation systems.

The role of the state and the commodification of knowledge

The original innovation system approach emphasized that traditional knowledge and learning are crucial for economic performance in the current era especially for the poor (Lundvall 1992). But it does not follow that all knowledge should be 'commodified' and this is what seems to have become the major tendency. There is a growing trend in political circles to regard all knowledge as a potential commodity and to subordinate all knowledge production under the logic of international competitiveness. This is reflected in a movement in favour of expanding and strengthening intellectual property rights to the extreme and far beyond what promotes socio-economic progress and as well in a strong drive toward colonizing academic knowledge and make it subordinate to market demand.

Innovation system

The role of research and development can be described as having three phases, namely:

1. Research as an engine of progress (1950s and 1960s) with a focus on support for fundamental knowledge development and linear vision of the "refinement" of knowledge.
2. Research as a problem solver (1970s).
3. Research as a strategic opportunity (1990s) and the beginning of the new millennium where Research is "interwoven" in a complex relationship with many players in its environment.
4. "The policy that was developed can be seen as a sedimentary system where different layers emerged during different periods and where aspects of the dominant policy remain and over which the new policy has formed a new layer." The view expressed in international development of policies for research and innovation systems that we have encountered in this study are mainly in line with the modern view of research as a strategic opportunity for societal development. There are a few distinct patterns that dominate: the most important role of research is to help generate economic property and develop of better solutions for various societal problems.

Two clear ambitions follow in from this:

- All nations are increasing research funding as a percentage of GNP although this being achieved through different political means. The most common political devices are widely used, such as increasing public research funding, introducing tax deductions to increase the amount of R&D conducted in industry or improve public procurement processes that include R&D.
- All nations want to make research more beneficial. This is being achieved by steering research results towards areas that are strategically important for society in a broad sense. Greater emphasis is being

place on the societal relevance requirement in order to receive research finding. The innovation system is also being influenced by encouraging entrepreneurship, increasing access to venture capital, reducing bureaucracy and increasing standardization, Providing stimulus for R&D within small and medium- sized enterprises, reinforcing the role of research institutes and developing IPR management. The Interaction within the various innovation system is also being intensified. Also, investments are being made in science – related entrepreneurship.

Scheme of sustainable approach for EVM

Managing Research Technology Development Innovation (RTDI) Programmes in ethno veterinary medicine

Systems of Innovation Approach- development of ethno plants of medical importance

Foresight- a five year to ten year plan for developing EVM products

Research and innovation policy- Support to research projects in EVM and development of medicines for diseases in animals.

Sustainable development – low cost products made available for rural masses to support their cattle

Gender equality - participation of women who are the stakeholders in this idea in villages. The importance of gender is being increasingly recognised in EVM. Women know more about healthcare for newborns and very sick animals that are taken care of near the home. The Tzotzil Maya shepherdesses who developed their own breed of sheep and have their own husbandry and healthcare system based on their traditions (Perezgrovas, 1996).

It was reported in Trinidad that male farmers were using the reproductive knowledge of their female relatives to assist in the health care of their ruminants. Female farmers were using the same plants for their animals that they used for themselves (Lans, 2004).

ANTHRA, an organization of women veterinary scientists, has been documenting and validating EVM since 1996 in different parts of the states of Andhra Pradesh and Maharashtra in India (Ghotge, 2002). ANTHRA chose to study EVM because women farmers performed 50 – 90% of all daily activities related to livestock care but were denied aspects of the local EVM because knowledge was traditionally passed from father to son.

Creative process for strategic change - a change from molecule based patented product to community development at grass-root level

Commercialisation of R&D – cottage units at decentralized mode to supply EVM to local people.

Changed conditions for the universities – support to EVM and related fields, programme design and management, environment, epidemiology and health.

EVM in future may be increasingly linked to discussions and research on ecosystem health. EVM is now increasingly integrated into “participatory epidemiology” which seeks to improve epidemiological surveillance in remote areas and encourage community participation in disease control (Mathias, 2004). EVM is also studied to provide solutions to diseases in which antigen variation has made vaccination unrealistic and drug resistant strains to Western medicines have become prevalent (Atawodi, 2002).

Regional innovation systems (RIS)- identification of endangered plants and plants of medicinal value, mass cultivation, micro propagation of difficult to cultivate plants, use of biotechnology tools in cultivation

Small and medium size companies- entrepreneurship development in EVM and formation of a consortium of technical, financial and experts

Research institutes – veterinary and agricultural universities, research institutes and other universities located in herbal plant regions and tribal belts and those with research projects in EVM. Developing world institutes involved in EVM include Mexico's Universidad Nacional Autónoma de Chiapas, Ethiopia's Addis Ababa University, the School of Veterinary Medicine of the University of the West Indies, and Rwanda's University Centre for Research on Traditional Pharmacology and Medicine. The Heifer Project International works in Cameroon with herders and healers experienced in EVM. The League for Pastoral People (L.P.P.) has worked with camel pastoralists in Rajasthan, India and has produced a field manual on camel diseases. Recent research on EVM in the developed world has come from Italy, British Columbia, Canada (Lans et al., 2006) and the Netherlands.

Intellectual property rights – The IPR shall accrue benefits to the stakeholders and custodian of ethnic plants. The PRELUDE database on traditional veterinary medicine has over 5000 plant-based prescriptions for livestock disorders with each plant listed by family.

The key actors programme – tribal people, academicians, government agencies, financial agents. Researchers, extension personnel

Open space- ideas available on EVM knowledge from all over the country may be taken for development.

Sectoral systems – fields of ethnic plants' knowledge i.e, biotechnology, agronomy, pharmacology, application industry

Drafting an internationalization strategy – partnering with nations in similar state of development eg., South Africa, Brazil, Kenya, Australia, China

Managing open innovation: This aims at giving an overview of the emerging research field of open innovation in a phase that is still very fluid. The purpose of this event is to depict the major tendencies of publications through identifying the main themes in literature and investigating the research frontier. It also aims at discussing potentially important fields of investigation that are still left rather unexplored. The opinions are used as an additional input when trying to identify the future directions for research.

Public procurement as a driver for innovation and change: "to examine how public procurement can contribute to developing innovation and creative renewal. The study is to include investigation as to how procurements may be structured in such a way that, to a greater extent, they drive forward technological development and business opportunities." It is necessary to assess which methods are the most appropriate to an innovation-promoting procurement process; the sectors in which the need is most urgent for establishing conditions to enable public procurement to become a driver of innovation and renewal; and the extent to which the development of public procurement may have an important role to play in implementing the strategic programmes formulated for key sectors. The report from the agencies was to be structured in such a way that it could serve as the basis of a policy including guidelines for public procurement as a driver of innovation and renewal.

Needs-driven R&D programmes in sectorial innovation systems: This describes the roles of needs-driven R&D funding from an innovation system perspective. It provides a picture of industrial activity and innovativity as well as research and needs-driven state R&D programmes in the sectorial innovation systems for biotechnology, nanotechnology, information and communication technology and the automotive industry.

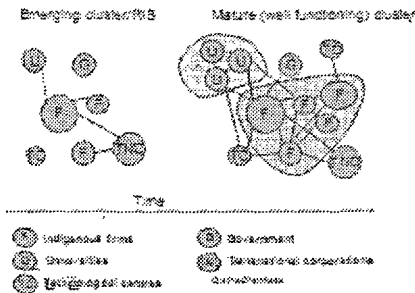
Role of industrial research institutes in the national innovation system: Herbal remedies used for hundreds of years by stockraisers can be put to commercial use, but scientists are demanding that traditional knowledge should be validated, to verify the safety and efficacy of the treatments. IT Kenya has a project in the Samburu District that is investigating effective EVM treatments. Vetaid is collaborating with the Animal Disease Research Institute of Dar-es-Salaam in Tanzania while the Christian Veterinary Mission is investigating EVM in Karamoja, Uganda. Other organizations in the field are ANTHRA and SEVA in India, ITDG and KEPADA in Kenya and World Concern in Uganda (Mathias, 2004). Studies on EVM have been commissioned by UNICEF.

- National and regional cluster profiles : Research centers and universities shall be developed for exploiting the knowledge of EVM
- Structural Funds as instrument to promote Innovation in EVM :
- Innovation Hotbeds :Introducing business opportunities in biotechnology, food, healthcare, industrial, and personal health
- The Development of Growth oriented high Technology Firms

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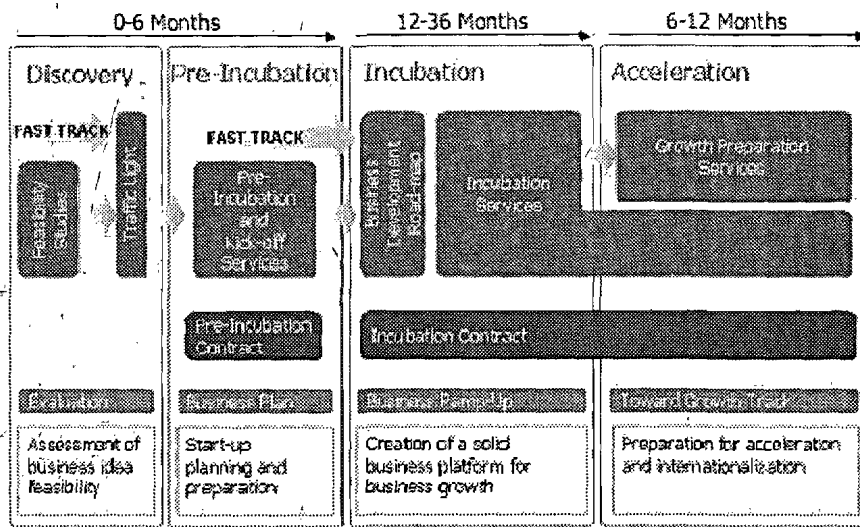
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Cluster approach (Chaminade, C.; Vang, J. (2008)

A business incubation program



Analysing clusters / RIS



Source: updating of Arora et al (1999)

Regional Innovation System

	Cluster	Regional Innovation System	Triple Helix
Focal Objectives	Commercialisation	Innovation	Development Growth
Industrial coverage	Various industries	Various industries	Various industries
Key organisations	Firms	All	Govt, University, Business
Main features	Interdependence and integration, industry specialisation, focus on a particular set of applications	Endogenous or exogenous, various industries, specialisation of the organisations	Alignment of organisations, various industries

Intarakumnerd, P.; Chaminade, C.; (2007)

